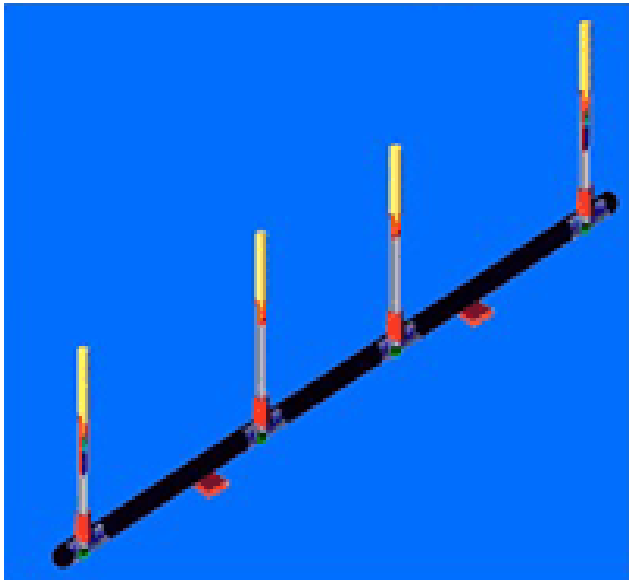
ROSETTA PLASMA CONSORTIUM MUTUAL IMPEDANCE PROBE

Mass (sensor):	0.37 kg
Power (average)	2.0 W
Electron Density (min):	2 cm^{-3}
Electron Density (max):	$1.5x10^{5}$ cm^{-3}
(LDL max):	280 cm^{-3}
(accuracy):	5%
Electron Temperature:	30 °K – 10^{6} °K
(accuracy):	10%
Plasma Drift Velocity:	100-1000 m/s
(accuracy):	100 m/s
Frequency Domain:	7 kHz-3.5 Mhz
(LDL):	7 kHz-168 kHz
Wave Sensitivity:	1 μV m^{-1} $Hz^{-1/2}$ at 100 kHz
Wave Dynamic Range:	>60 dB
Debye Length:	0.5-20 cm
(LDL):	10-200 cm
Nrmal Time Resolution:	2.5 s (burst)
	8 s (normal)
	32 s (survey)



Electric Field Antenna with

2 Receivers, 1 m apart

2 Transmitters

Conductive Bar

Can use Langmuir Probe (LDL) as an additional transmitter (gain of 4 m in length)

RPC MIP
Data Set Evaluation Tools

Evaluation -

Machine: IBM Ienovo T60p ThinkPad

Operating System: Fedora 25 Linux

Evaluation -

Machine: Dell Precision T3400

Operating System: Fedora 19 Linux

Data Processing -

Machine: Sun Ultra-350

Operating System: Sun Solaris OS 5.9

RPC MIP Data Sets

ro-c-rpcmip-3-prl1-v2.0
ro-c-rpcmip-3-prl2-v2.0
ro-c-rpcmip-3-prl3-v2.0
ro-c-rpcmip-3-esc1-v2.0
ro-c-rpcmip-3-esc2-v2.0
ro-c-rpcmip-3-esc3-v1.0
ro-c-rpcmip-3-esc4-v1.0
ro-c-rpcmip-3-ext1-v1.0
ro-c-rpcmip-3-ext2-v1.0
ro-c-rpcmip-3-ext3-v1.0

Documentation Evaluation

ro-c-rpcmip-3-ext3-v1.0 aareadme.txt

GOOD

ro-c-rpcmip-3-ext3-v1.0
dataset.cat

GOOD

ro-c-rpcmip-3-ext3-v1.0/catalog
catinfo.txt

```
coded in the Object Description Language (ODL).  Following is a list
of the catalog objects contained in this subdirectory and a
description of each:

FILE                DESCRIPTION
 ---------   ------------------------------------------------

CATINFO.TXT   This file
DATASET.CAT   Contains information on the RPCMIP dataset.
INST.CAT      Contains  information for RPCMIP instrument
INSTHOST.CAT  Contains instrument host information (ROSETTA-Orbiter).
MISSION.CAT   Contains mission information (ROSETTA).
PERSON.CAT    Contains information about the RPCMIP personnel
REF.CAT       Contains reference information.
SOFTWARE.CAT  Contains nothing whatsoever.
TARGET.CAT    Contains._
```

Missing File...Not in this Directory

ro-c-rpcmip-3-ext3-v1.0/catalog dataset.cat

GOOD

ro-c-rpcmip-3-ext3-v1.0/catalog
inst.cat

GOOD

ro-c-rpcmip-3-ext3-v1.0/catalog person.cat

GOOD

ro-c-rpcmip-3-ext3-v1.0/catalog ref.cat

There are two references in the proposed list which are ITAR controlled documents. The SwRI Legal Department reports “Revealing the existence of an ITAR controlled document is itself a violation of ITAR”.

The JPL Library staff has acknowledged that the following two references to JPL Documents are not cleared for public release: ASMAR&HERRERA1993 and ASMARETAL1995. They should not be included in this reference list and should not be referenced in the public archive. Please remove these references.

RID002

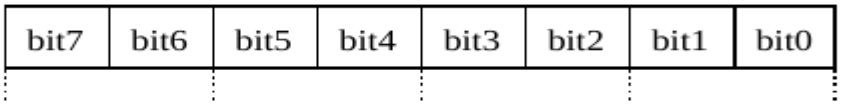
ro-c-rpcmip-3-ext3-v1.0/catalog software.cat

```
SOFTWARE_DESC = "
  Software Overview
  ================
  Available Support Material
  ==========================
  BINARIES
  Programming Language
  ====================
  Platforms Supported
 ===================
 Support Software Required / Used
 ================================ "
```

It should be stated here that “No Software is needed for this archive” rather than leaving blank fields. Without a statement such as this, it is uncertain if these sections were just not filled in as opposed to the no software condition.

RID003

ro-c-rpcmip-3-ext3-v1.0/document mip_piu_interf_33.pdf



ADC overflows

Misaligned Figure

sequence counter (modulo 4)

0 0	TM minimum rate
0 1	TM normal rate
1 0	reserved
1 1	TM burst rate

0 0	MIP science sequence
0 1	LDL science sequence
1 0	control sequence
1 1	table sequence

Table 12. Definition of the sequence data header.

The overflows of the Analog to Digital Converter are coded with the following rules :

0 :	number = 0
1 :	1 ≤ number < 128
2 :	128 ≤ number < 1024
3 :	number ≥ 1024

3.3.3. Control sequence

RID004

ro-c-rpcmip-3-ext3-v1.0/document mip_piu_interf_33.pdf

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Reception table		*wd2*	*wd1*	*RAM tests*		*DSP tests*	

Misaligned Figure

00 OK
01 one error R/W
10 two errors R/W
11 three errors R/W

00 OK
01 one error Read/Write
10 two errors Read/Write
11 three errors Read/Write

0 OK
1 false

0 OK
1 false

00 table received during the Control sequence
01 time-out during the switching on procedure
10 table received during a Science sequence
11 LDL command received during a Control sequence

Table 14. Description of the test output in the Control sequence.

3.3.3.3. Configuration table

The configuration table contains all the parameters which can be modified in the onboard software. The size of 6 bytes corresponds to one link-packet between PIU and MIP. All the commands are inserted into the table. The description is done in Table 15.

	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
byte0	Interference frequency n°1							
byte1	Interference frequency n°2							

RID004

ro-c-rpcmip-3-ext3-v1.0/document rpc-mip_eaicd.pdf

Missing from Section 1.7 Acronyms and Abbreviations in the EAICD used through out the document:

PIU
SDL
SONC

rID005

ro-c-rpcmip-3-ext3-v1.0/document rpc-mip_eaicd.pdf

Under section 2.3.7, rather than include a “TBD”, why not just say:

LPC2E will produce derived data from RPC-MIP data on an undetermined schedule.

RID006

ro-c-rpcmip-3-ext3-v1.0/document rpc-mip_eaicd.pdf

3.1.1 Deliveries and Archive Volume Format

A data set will be delivered for each **simple mission phase.** Each data set will contain **only one level data processing**.

The list of simple mission phases is given in [AD 5] §2.1, table 3(a).
A level 3 data set contains SC an HK calibrated data.
A level 5 data set contains derived data.
In addition a data set will contain documentation(see chapter 2.3.5)

Does this mean a Section in this document, or a Chapter in AD 5?

RID007

ro-c-rpcmip-3-ext3-v1.0/document rpc-mip_eaicd.pdf

3.4.3.8 Label Directory

The label directory contains include files referenced by data files on the data set, e.g. FMT files containing label definitions used in data label files. The following files are contained in the Label directory.

File Name	File Contents
MIP_SPECTRUM_SS_PO.FMT	The description of the spectrum table for the Survey/Sweep modes and Full, Window and MinMax sub-modes.
MIP_SPECTRUM_SS_PH.FMT	The description of the structure of the TABLE object for the Phase spectrum for the Survey/Sweep modes.
MIP_SPECTRUM_L_PO.FMT	The description of the power spectrum table for the LDL modes, Full/Window sub-modes
MIP_SPECTRUM_L_PH.FMT	The description of the phase spectrum table for the LDL modes, Full/Window sub-modes
MIP_SPECTRUM_P_PO.FMT	The description of the spectrum table for the Passive mode and Full, Window and Power sub-modes
MIP_CONFIG_TABLE.FMT	The description of the TABLE object for the MIP configuration table
MIP_CALIBRATED_HK.FMT	The description of the TABLE object for MIP calibrated HK data

Files not found in this list are MIP_SPECTRUM_SS_PO.FMT, MIP_SPECTRUM_SS_PH.FMT, MIP_SPECTRUM_L_PO.FMT, MIP_SPECTRUM_L_PH.FMT, MIP_SPECTRUM_P_PO.FMT.

Files found in the label directory and missing from this list are labinfo.txt, mip_spectrum_l_po_w.fmt, mip_spectrum_p_po_w.fmt, mip_spectrum_p_po_f.fmt, mip_spectrum_p_po_p.fmt, mip_spectrum_s_ss_ph_f.fmt, mip_spectrum_s_ss_po_f.fmt, mip_spectrum_s_ss_po_m.fmt, mip_spectrum_s_ss_po_w.fmt

RID008

ro-c-rpcmip-3-ext3-v1.0/document rpc-mip_eaicd.pdf

Under section 3.4,3.9, Document Directory, the files listed as RPC_UM_208.PDF and RPC_UM_208.LbL were not found. Found were files RPC_UM_218.PDF and RPC_UM_218.LbL. The files listed as RPC-MIP-UG-LPC2E_V10.PDF and RPC-MIP-UG-LPC2E_V10.LBL were also not found. Found were files RPC-MIP-UG-LPC2E_V11.PDF and RPC-MIP-UG-LPC2E_V11.LBL.

ro-c-rpcmip-3-ext3-v1.0/document rpc-mip_eaicd.pdf

RPCMIP{data characteristics}_{begin of observation}_{duration of observation }.{ext}

- **data characteristics** (4 characters) = abcd
  - a = data type, S (science) or H (housekeeping)
  - b = data level, 3 or 5
  - c = physical parameters
    - E = electric field power spectrum (passive)
    - W = Active power spectrum (induced electric field)
    - H = active phase spectrum (induced electric field)
    - D = electron density
    - T = electron temperature
    - X = N/A (for HK and configuration tables)
  - d = working mode
    - S = SDL (MIP), Short Debye Length. MIP does the transmission and reception in Sweep and Survey modes
    - L = LDL (MIP/LAP), Long Debye Length. LAP does the transmission and MIP the reception.
    - X = N/A (for HK and configuration tables)

File name are found to have 5 characters for data characteristics. The fifth character is not explained in the EAICD.

RID010

Data Evaluation

Data Timing

The timing of MIP spectra was found not to be the values of 2.5, 8, or 32 sec as started by the instrument paper (document called mep_exp_overview.pdf), so timing was set to the time width between successive records or 32 sec which ever was shorter. The timing of data samples should be included within the EAICD for each data file type. Spectra were achieved by setting collection to parallel with a data accumulation of zero sec and the above time width. Data were drawn across the time width.

ro-c-rpcmip-3-ext3-v1.0/data rpcmips3esf1507010000_01445.tab

The start time of this data set was found to be incorrect. For example, the first 7 records have time stamps as follows:

2015-07-01T00:00:03.630 "1/394329523.15681" "PASSIVE" "FULL " "POWER"
2015-07-01T00:00:03.630 "1/394329523.15681" "PASSIVE" "FULL " "POWER"
2015-07-01T00:00:08.010 "1/394329523.15681" "PASSIVE" "FULL " "POWER"
2015-07-01T00:00:08.010 "1/394329523.15681" "PASSIVE" "FULL " "POWER"
2015-07-01T00:00:12.390 "1/394329523.15681" "PASSIVE" "FULL " "POWER"
2015-07-01T00:00:12.390 "1/394329523.15681" "PASSIVE" "FULL " "POWER"
2015-07-01T00:00:16.770 "1/394329523.15681" "PASSIVE" "FULL " "POWER"

The instrument paper gives time resolutions of 2.5, 8, or 32 sec; however, this appears to be none of these. I have not been able to find a document which lists spectral resolutions other than these values. Accumulation times should be documented in the EAICD. Additional duplicate times found in some processed files are included as a note. In order to draw data, duplicate time records were excluded.

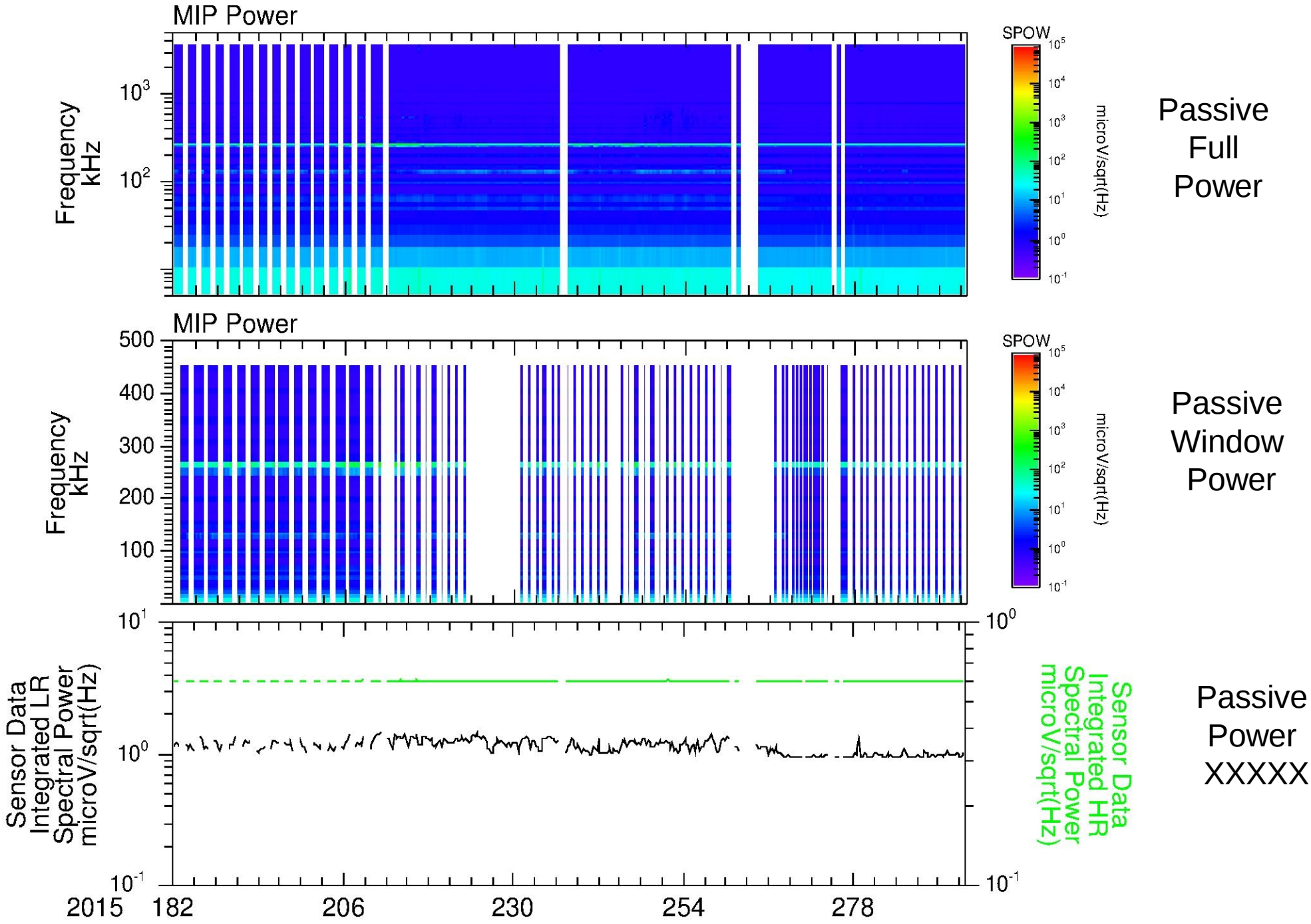
ro-c-rpcmip-3-ext3-v1.0/data
rpcmips3wsf1510151358_01447.tab

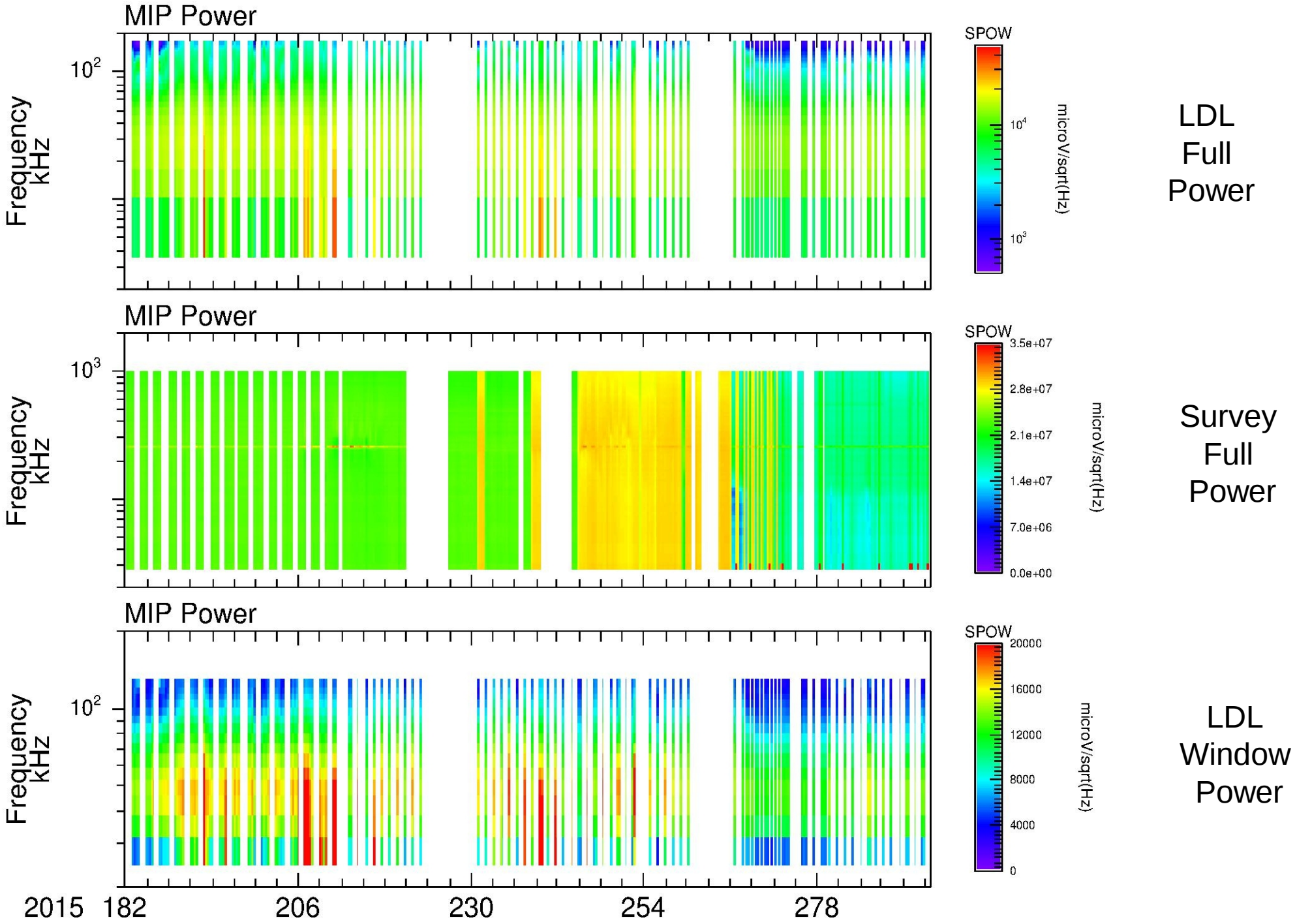
The timing has been found to run backward in some data. For example:

WS File to process: ../MIPData/rpcmips3wsf1510151358_01447.tab
Record 17864 skipped because of time runs backward: 2015-10-16T12:39:43.000. Sequential time stamps are:

2015-10-16T12:39:39.520 "1/403619883.15681" "SURVEY" "FULL " "POWER"
2015-10-16T12:39:43.900 "1/403619883.15681" "SURVEY" "FULL " "POWER"
2015-10-16T12:39:43.000 "1/403619915.15681" "SURVEY" "FULL " "POWER"
2015-10-16T12:39:47.380 "1/403619915.15681" "SURVEY" "FULL " "POWER"

Time jumps backward from 2015-10-16T12:39:43.900 to 2015-10-16T12:39:43.000. In order to draw data, backward time records were excluded. Backward and duplicate time records should not exist in the data.


MIP Power
Frequency kHz
SPOW
microV/sqrt(Hz)
Passive Full Power
MIP Power
Frequency kHz
SPOW
microV/sqrt(Hz)
Passive Window Power
Sensor Data Integrated LR Spectral Power microV/sqrt(Hz)
Sensor Data Integrated HR Spectral Power microV/sqrt(Hz)
Passive Power XXXXX
2015
182
206
230
254
278


MIP Power
Frequency kHz
10^2
SPOW
10^4
10^3
microV/sqrt(Hz)
LDL Full Power
MIP Power
Frequency kHz
10^3
SPOW
3.5e+07
2.8e+07
2.1e+07
1.4e+07
7.0e+06
0.0e+00
microV/sqrt(Hz)
Survey Full Power
MIP Power
Frequency kHz
10^2
SPOW
20000
16000
12000
8000
4000
0
microV/sqrt(Hz)
LDL Window Power
2015 182 206 230 254 278

Backup Slides